

REMARKS

In the Office Action¹, the Examiner rejected claims 4, 7-11, 14, 16, 18, 19, and 21² under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,949,101 to Aritome ("*Aritome*"); rejected the above-noted claims under 35 U.S.C. § 103(a) as being unpatentable over JP 2001-274367 to Hagiwara ("*Hagiwara*"); and allowed claims 5, 15, and 22.

Applicant gratefully acknowledge the Examiner's allowance of claims 5, 15, and 22. Applicant respectfully traverses the rejections and requests reconsideration for at least the following reasons.

Rejection of Claims under 35 U.S.C. § 103(a) over *Aritome*

Applicant respectfully traverses the rejection of claims 4, 7-11, 14, 16, 18, 19, and 21 under 35 U.S.C. § 103(a) as being unpatentable over *Aritome*. A *prima facie* case of obviousness has not been established.

"The key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. ... [R]ejections on obviousness cannot be sustained with mere conclusory statements." M.P.E.P. § 2142, 8th Ed., Rev. 6 (Sept. 2007) (internal citation and inner quotation omitted). "All words in a claim must be considered in judging the patentability of that claim against the prior

¹ The Office Action may contain statements characterizing the related art, case law, and claims. Regardless of whether any such statements are specifically identified herein, Applicant declines to automatically subscribe to any statements in the Office Action.

² The Office Action also rejects claims 17 and 20 on the same ground. However, Applicant notes that claims 17 and 20 have already been canceled in an Amendment filed April 3, 2009. Therefore, the rejection of these two claims is moot.

art.” M.P.E.P. § 2143.03. “In determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious.” M.P.E.P. § 2141.02(I) (emphases in original).

“[T]he framework for objective analysis for determining obviousness under 35 U.S.C. 103 is stated in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966). ... The factual inquiries ... [include determining the scope and content of the prior art and] ... [a]scertaining the differences between the claimed invention and the prior art.” M.P.E.P. § 2141(II). “Office personnel must explain why the difference(s) between the prior art and the claimed invention would have been obvious to one of ordinary skill in the art.” M.P.E.P. § 2141(III).

Claim 4 calls for a combination including, for example, “a plurality of second trenches formed in [a plurality of] isolating fillers [filled in a plurality of first trenches]” (emphasis added). The Office asserted that *Aritome* teaches these elements. However, this is not correct.

Specifically, regarding FIG. 6A of *Aritome*, *Aritome* at best teaches forming “element separating trenches,” and filling these trenches using “an insulation film 2,” “a third gate insulation film 33,” and “a second gate electrode 6.” *Aritome*, col. 7, ll. 27-39. The Office appeared to consider the “element separating trenches” and “insulation film 2” to correspond to the claimed “first trenches” and “isolating fillers,” respectively. Office Action, p. 2. Even if this were correct, which Applicant does not concede, *Aritome* still fails to teach or suggest the claimed “second trenches.” As taught in *Aritome*, “the oxide film 2[, i.e., insulation film 2,] is etched back by RIE until the

polycrystalline silicon film 4 and part of the silicon substrate on the side walls of the [element separating] trench are exposed,” and then “insulating film 33” and “polycrystalline silicon film 6[, i.e., second gate electrode 6]” are successively formed in the element separating trench and on top of the insulation film 2. *Aritome*, col. 9, ll. 10-43, and FIGS. 9B-9D. No additional trenches are formed in the insulation film 2.

Regarding FIG. 12G of *Aritome*, the Office appeared to consider the trench filled by a SiO₂ film 12 and the SiO₂ film 12 to correspond to the claimed “first trenches” and “isolating fillers,” respectively. Office Action, p. 2. Even if this were correct, which Applicant does not concede, *Aritome* still fails to teach or suggest the claimed “second trenches.” As taught in *Aritome*, the SiO₂ film 12 is etched back by RIE and then a polycrystalline silicon film 75 is formed in the trench and on top of the SiO₂ film 12. *Aritome*, col. 10, ll. 14-18 and ll. 41-42, and FIGS. 12B-12G. No additional trenches are formed in the SiO₂ film 12.

In view of the above, *Aritome* fails to teach or suggest at least “a plurality of second trenches formed in [a plurality of] isolating fillers [filled in a plurality of first trenches]” as recited in claim 4 (emphasis added).

Moreover, claim 4 further calls for a combination including, for example, “said second trenches being in the shape of inverted trapezoid” (emphasis added). The Examiner conceded that *Aritome* does not teach these elements but then contended that “[t]he shape [] differences are considered obvious design choices and are not patentable unless unobvious or unexpected results are obtained from these changes ... [t]herefore this claim is not patentable over *Aritome*.” Office Action, p. 3. However, this is not correct.

Particularly, Applicant respectfully submits that the shape of the second trenches is not an obvious design choice. As explained in the Specification, such a shape is, among other things, effective in improving insulation resistance between the word line in the second trench and the semiconductor substrate. See, e.g., Specification, p. 10, ll. 1-6, and p. 15, ll. 16-19. On the other hand, even if *Aritome* taught “second trenches,” which Applicant does not concede, *Aritome* does not aim at improving insulation resistance between the word line in the second trenches and the semiconductor substrate. Accordingly, without knowledge of Applicant’s teaching and recognition of the benefits that could be achieved by the claimed invention, it would not be obvious to choose a shape for the second trenches as recited in claim 4.

Therefore, the Office has neither properly determined the scope and content of the prior art nor properly ascertained the differences between the prior art and the invention of claim 4. Moreover, there is no motivation for one of ordinary skill in the art to modify the teachings of the references to achieve the claimed combinations. Thus, no reason has been clearly articulated as to why claim 4 would have been obvious to one of ordinary skill in the art in view of the prior art. Accordingly, a *prima facie* case of obviousness has not been established with respect to claim 4, and claim 4 is allowable over *Aritome*.

Independent claim 14, although different from independent claim 4, recites elements similar to those noted above for claim 4. Therefore, for reasons similar to those discussed above, claim 14 is also allowable over *Aritome*.

Claims 7-11, 16, 18, 19, and 21 are also allowable at least by virtue of their dependence from claim 4 or 14.

Therefore, Applicant respectfully requests that the Examiner withdraw the rejection of claims 4, 7-11, 14, 16, 18, 19, and 21 under 35 U.S.C. § 103(a).

Rejection of Claims under 35 U.S.C. § 103(a) over *Hagiwara*

Applicant respectfully traverses the rejection of claims 4, 7-11, 14, 16, 18, 19, and 21 under 35 U.S.C. § 103(a) as being unpatentable over *Hagiwara*. A *prima facie* case of obviousness has not been established.

Claim 4 calls for a combination including, for example, “a plurality of second trenches ... being in the shape of inverted trapezoid” (emphasis added). The Examiner conceded that *Hagiwara* does not teach these elements but then contended that “[t]he shape [] differences are considered obvious design choices and are not patentable unless unobvious or unexpected results are obtained from these changes ... [t]herefore this claim is not patentable over *Hagiwara*.” Office Action, p. 6. However, this is not correct.

As already noted above, Applicant respectfully submits that the shape of the second trenches is not an obvious design choice. As explained in the Specification, such a shape is, among other things, effective in improving insulation resistance between the word line in the second trench and the semiconductor substrate. See, e.g., Specification, p. 10, ll. 1-6, and p. 15, ll. 16-19. On the other hand, even if *Hagiwara* taught “second trenches,” which Applicant does not concede, *Hagiwara* does not aim at improving insulation resistance between the word line in the second trenches and the semiconductor substrate. Accordingly, without knowledge of Applicant’s teaching and recognition of the benefits that could be achieved by the claimed invention, it would not be obvious to choose a shape for the second trenches as recited in claim 4.

Therefore, the Office has neither properly determined the scope and content of the prior art nor properly ascertained the differences between the prior art and the invention of claim 4. Moreover, there is no motivation for one of ordinary skill in the art to modify the teachings of the references to achieve the claimed combinations. Thus, no reason has been clearly articulated as to why claim 4 would have been obvious to one of ordinary skill in the art in view of the prior art. Accordingly, a *prima facie* case of obviousness has not been established with respect to claim 4, and claim 4 is allowable over *Hagiwara*.

Independent claim 14, although different from independent claim 4, recites elements similar to those noted above for claim 4. Therefore, for reasons similar to those discussed above, claim 14 is also allowable over *Hagiwara*.

Claims 7-11, 16, 18, 19, and 21 are also allowable at least by virtue of their dependence from claim 4 or 14.

Therefore, Applicant respectfully requests that the Examiner withdraw the rejection of claims 4, 7-11, 14, 16, 18, 19, and 21 under 35 U.S.C. § 103(a).

CONCLUSION

In view of the foregoing amendments and remarks, Applicant respectfully requests reconsideration and reexamination of this application and the timely allowance of the pending claims.

Please grant any extensions of time, not otherwise requested, which are required to enter this response and charge any additional required fees to our deposit account 06-0916.


Respectfully submitted,

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